

Digital Connection

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Alacrity (RTTY and FLDIGI)

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One of the oldest digital modes is RTTY, a mode that I have not yet (in 21 years) discussed on these pages. This, then, is an introduction to one of the most popular digital modes in use today.

RTTY, which is short for Radio Teletype, is a keyboard-to-keyboard mode used for major contests, casual ragchews, and everything in-between. It is also an ancient mode, dating to the late 19th century.



Figure 1: A Siemens T100 desktop Teletype machine from the late 1950s. At the left is the paper tape machine, which punched holes into a paper tape to be used as a storage medium. This is well before floppy disks. Messages were punched into tape offline, and fed back on the air (through the tape reader, at right) to minimize the time it took to send the message. Image courtesy of Nightflyer from the German-Language Wikipedia (de.wikipedia.org).

Way back in the day, Teletype was a commercial endeavor, an alternative to Morse code telegraphs that dispensed with the need for highly-trained operators. Once radio was invented, it wasn't long before Radio Teletype

became a thing – and Hams got into it not long after.

Like many modern digital modes, RTTY is most often used as a keyboard-to-keyboard mode. It is somewhat less robust in the case of a noisy radio channel than PSK31, but it is fair to compare both modes and find them roughly the same. Neither uses error-correction, so noise can allow random characters to appear.

When I was a kid, working RTTY required the ownership of a Teletype (or Telex) machine, a finicky electromechanical contraption used to send and receive Teletype. Today instead of repurposing a electromechanical teletype machine, we use computers to encode and decode the 5-bit Baudot code at 45.45 baud – both named after Émile Baudot. There are several programs to operate RTTY: A quick Internet search will identify these, and you'll also find several web pages naming the merits of each.

Let's talk about FLDIGI, which is a new-old software application written by Dave Freese W1HKJ (and several others: <<http://bit.ly/1K3Hyyn>>) that is an outstanding program for digital communications enthusiasts in its own right. I say new-old because this application has been around for a several years – indeed, I first wrote about it in the August 2011 issue of CQ, and then twice more, and will again be repeating today some of what I said back then.

The first very unusual thing about FLDIGI is that it capably works with so many digital modes, from CW, PSK31 and RTTY to Throb, Domino EX11 and Olivia. See the FLDIGI help page mentioned previously for a complete listing of the modes FLDIGI operates.

The second very unusual thing about FLDIGI is that it is available for Linux, Unix and Mac OS X, along with the usual Windows (including

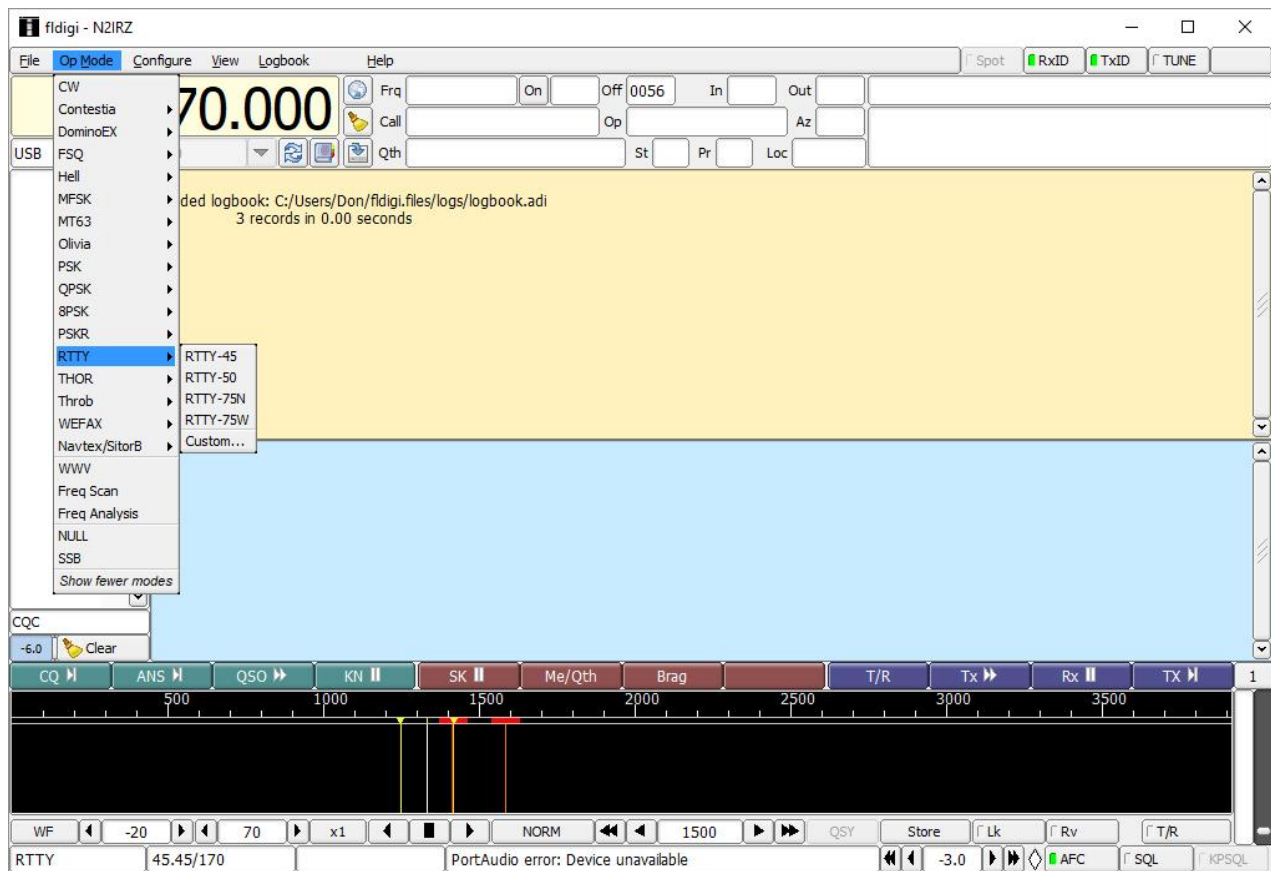


Figure 2: The main FLDIGI window in RTTY mode (Version 3.22, about a year old, is shown. A newer version is available). I've expended the Op Mode menu so you can see the RTTY choices: You want to use RTTY-45 for normal operations. Yellow is the RX window, blue is TX. The waterfall display at the bottom lets you see signals and tune them in.

Windows 10) versions. Those of us using Microsoft's operating systems are a bit spoiled, since virtually everything is available for Windows. Our friends using Apple computers and Linux are often not so fortunate. FLDIGI and its related components are a welcome exception. Figure 1 shows a partial screen shot of the download page where the various versions are shown. Note that source files (in C++) and several individual FLDIGI components are also available separately.

As described on the FLDIGI help page <<http://www.w1hkj.com/FldigiHelp/index.html>>, FLDIGI supports a large number of digital modes. And to say that it does each of them elegantly is a fair statement. I'd written about NBEMS (Narrow Band Emergency messaging Software) in 2011, a system which uses several FLDIGI features for Emergency Communications, which is one use for FLDIGI. For some specialized tasks, there are a few additional programs that would surely come in handy. Oh, and they are all offered for free. In fact, on his website,

W1HKJ answers the question "How can I support FLDIGI?" with this eloquent text:

I have received several requests for information on providing support for fldigi. I have been blessed with good health and sufficient income to allow me to enjoy our great hobby for over 54 years. I consider fldigi and all of the other software as my gift back to all of the great hams with whom I have QSO'd over the years and to those I still hope to catch on the waterfall. So monetary support is not needed or solicited.

Instead I request that you make a contribution to your favorite charity. Name me in recognition or simply make an anonymous contribution; either suffices. You would do me great honor if your contribution were made to the Gideons International <<https://www2.gideons.org/>> through their gift Bibles recognition program.

Thanks Dave for your generous gift to the Amateur Radio community.

From my point of view, FLDIGI is simply a great everyday program to operate digital modes – and that's what we're here for, right?

Connecting your radio is either easy or trivial. If you have a digital interface already, for example for PSK31, you're all set. If you don't, you can either buy one (there are many under \$100) or build one (see <<http://www.aa5au.com/rtty/fsk-interface/>> for some ideas).

Essentially, you need a cable to go from the radio's receive audio into your computer's sound card, another cable for the transmit audio, and something to control the transmitter, a PTT circuit.

RTTY can be transmitted as Audio Frequency Shift Keying (AFSK), which uses audio tones (usually 2125 and 2195 Hz, which are 170 Hz apart) to modulate a transmitter. Other tones can be used, as long as they are 170 Hz apart (although some systems, such as my PK-232, use 200 Hz, which can generally be decoded), but the tones are selected to be in the sweet spot of the audio passband of most radios.

You can also directly key your radio if it is equipped with an FSK input. Here, we On-Off Key the radio directly, avoiding the need to set the transmit audio level. Many radios don't allow the use of narrow audio filters in Single-Sideband mode, which has a significant impact on your receive sensitivity, while in FSK mode these narrow (250 Hz is typical) filters are available, greatly reducing the effects of noise.

Alas, my Icom IC-706 MK2G is not equipped with a direct FSK input, so AFSK is my only real choice. If your radio does have an FSK input (see a list at <http://www.aa5au.com/rtty/rty-radios/>) you are generally better using that instead of AFSK. The exception is if you're already fully set up for audio-based digital modes, because, well, you're already all set up.

Oh, just a short plug for AA5AU's web page, a wealth of RTTY (and other) information, at aa5au.com. Don is a big fan of MMTTY software, which I have never tried, but as I mentioned at the start of this month's column, there are several RTTY programs, and all of them have their unique merits.

Operating RTTY somewhat depends on your intent: If you're joining the CQ WW RTTY Contest (held each year on the last full weekend of September) your operating procedure will be quite different from a casual ragchew.

Not being a contester, I feel it would be unfair (and probably a bit dumb) for me to describe how to operate. That being said, I will refer you to two places: The first is The CQ WW RTTY Contest home page at <https://www.cqwwrtty.com/index.htm>. The second is the home of RTTY Contesting, the aptly-named <http://www.rttycontesting.com/>. Between these two, anything you'd ever want to know can be found.

Figure 3: W1HKJ's software page at <http://www.w1hkj.com>. This lists all of the various applications for the supported operating systems, including Windows, Mac OS X, and Linux. Here is also where you'll find the documentation and, if you're interested, the source code as well. Version 4.0.12

(current as of early November 2017) includes the RTTY application.

One thing I need to mention whenever I talk about digital soundcard modes: It really is critically important that you set your transmit audio (when using AFSK of course – FSK has no such need) and (to a lesser extent) RF power levels properly. Search YouTube (<http://www.youtube.com>) for "PSK31 Level K7AGE" for a nice video explaining how to do this. Although this shows PSK31, it's valid for all sound card digital modes. As for RF power, since RTTY is a 100% duty cycle mode, transmitting at greater than 50% power (50 watts for my IC-706) will unnecessarily stress your radio, possibly overheating or damaging it.

Some digital modes, such as MT63 and Olivia, depend upon accurate sound card clock frequencies to tune and decode signals. Sound cards don't generally hold the kind of frequency accuracy desired for optimal performance, so it's a good idea to calibrate your sound card. You only have to do this once. In a pinch you can get away without it, but best to do it if you can.

I'm not going to describe in detail how RTTY works – you can look that up if you like – instead a brief note on making a call. The first step is to tune to RTTY activity and listen. Frequencies include the areas around 3580, 7080, 14080 and 21080. In your listening – watching, really – look for how others are operating, and copy them. My typical RTTY call looks like this:

`<CR>CQ CQ CQ CQ DE N2IRZ N2IRZ PSE K<CR>`

The leading and following Carriage returns help to make your call stand out from typical noise on the channel. Some may include a few more CQs or callsigns, but if band conditions seem good you can cut back a few. The PSE (please) is just good manners, which you'll find far more common than on Phone.

On the air, you'll also find many CW procedures and abbreviations used, like DE for 'from', Q-signals and the like. If you see something you don't understand, it is OK to ask: we were all beginners at one time. And lastly: Most text uses uppercase, but RTTY can send lowercase, numbers and several symbols. The reason you don't see them often is that it takes a little longer to transmit those characters. Look up Figures Shift and Letters Shift to learn why!

Have I convinced you to try it? If you are already into digital modes, it is very likely you are already using FLDIGI, and perhaps just need to download a new version. But if you are one of the twenty-six CQ readers who have not yet tried to operate a digital mode (aside from CW, perhaps) then FLDIGI is absolutely an excellent

and versatile program, and worth your time to load, configure and get on the air.

As with most other digital software, if you're not sure you really want to commit, try using the software to listen only: All you need is an audio patch cable from the speaker or headphone output of your radio to the input of your computer's sound card. Be sure to turn the volume way down, at least until you determine there isn't too much audio.

Of course, step one is to get the software, install and configure it. Getting the software is as easy as visiting the download page <<http://www.w1hkj.com/download.html>>. I recommend downloading all of the applications that apply to your operating system: You might not need them now, but it doesn't hurt to have them handy. They're small, too, so disk space shouldn't be an issue. For Windows, they are self-installing .EXE files, so installation is as easy as a double-click. If you encounter trouble, read the documentation, as some older versions of Windows might need a tweak or two.

Also, allow the program to install the desktop shortcuts, otherwise you have to go to C:\My Programs and select the runtime .exe file. When FLDIGI first runs, the automatic configurator starts, which is a handy way to set up the program with minimal effort. Of course, you can also configure or change everything from the Configure menu at any time.

All of the installation files can easily fit on a CD or memory stick for on-the-fly installations on just about any computer. Once installed, the applications don't consume a lot of resources, and are easy to uninstall without a trace later.

When I set up the various displays and modes, I used the information on the FLDIGI 'Configuration' page <http://www.w1hkj.com/FldigiHelp/configuration_page.html> and all is working just fine.

As for support for RTTY, the web is teeming with resources. I'd be very surprised if those web sites I've mentioned above didn't have all

the information you want, but a web search will bring up hundreds more.

So that's RTTY in a nutshell. Although I touched upon a few important points with the installation and configuration, for two reasons I'm not going to explain in detail how to install, configure and use the software. The first reason is that I'm simply out of space this month. The second reason is that the on-line resources are quite good. To find out how to get the FLDIGI software programs, install, configure, calibrate, use and troubleshoot them check out the web pages mentioned in the article.

This month's column idea came from a reader just like you. Got an opinion on what you'd like to see here? Drop me a line.

Until next time,
73 de Don N2IRZ.

Software By W1HKJ & Associates

All source, dmg, and Windows setup files are now available on this [site](#) and at [Source Forge](#)

1 Nov 2017

[Support fldigi with a contribution to your favorite charity](#)

And whatsoever ye do, do it heartily, as to the Lord, and not unto men. Colossians 3:23

Software	Version	Date	Download @ W1HKJ	On-Line Help @ W1HKJ
fldigi / flarq	4.0.12 / 4.3.6	10/28/2017	fldigi	fldigi help
flrig	1.3.36	11/01/2017	flrig	flrig help
flmsg	4.0.3	07/19/2017	flmsg	flmsg help
flamp	2.2.03	10/07/2015	flamp	flamp help
fllog	1.2.4	06/24/2016	fllog	fllog help
flnet	7.3.2	12/12/2016	flnet	flnet help
flwkey	1.2.3	03/24/2016	flwkey	flwkey help
flwrap	1.3.4	10/17/2015	flwrap	flwrap help
flcluster	1.0.3	10/15/2017	flcluster	flcluster help
linsim (test suite)	2.0.3	10/25/2017	linsim	linsim help
comptext (test suite)	1.0.1	10/07/2015	comptext	comptext help

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Author Note: The title "Alacrity" was a joke, as in "I Like RTTY".

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